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ENVIRONMENT VIEWS

A Look at Alberta's Forests

ENVIRONMENT
VIEWS

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PETER LEE

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Alberta
ENVIRONMENT

EDITOR'S NOTEBOOK

Speak Up About Forest Resource

They built a kraft pulp mill in Kamloops, my home town, in the late 60s. I was in high school at the time and therefore preoccupied with lesser things, but I don't remember much controversy about it, much discussion about whether the jobs it would provide would be a fair trade for the pervasive smell, the winter fog and the mustard yellow effluent ponds.

A few nature-loving types may have grumbled about the effect on the water quality downstream, but it was generally accepted; all that was just part of the deal when you made your living, as Kamloops did, from the forests and the mines. City council, with the help of the local MLA, a flamboyant character named Phil Gagliardi (Flying Phil, remember him?) were very pleased with their work in attracting the mill to town. "That's not pollution, that's the smell of money," Gagliardi used to say when he'd step out of a plane into the acrid smell of the nearby pulp mill.

Times have changed, of course. While the new northern forest development is welcome for the jobs and other economic benefits it promises, there is widespread concern about the environmental cost, and not just from a few naturalists.

At the same time, the mills themselves have changed for the better. Alberta has a policy of requiring the newest pollution control technology (the "leading edge technology") for new plants. In this issue, writer Claire Stirling reviews this technology and talks to both sides of the pulp mill issue (see story page 15).

While much of the concern expressed recently has been about the impact of the mills themselves, other issues include concern about the level of public participation in the decision-making processes and about the future of the boreal forest, now that such a massive area is committed to feeding the seven northern pulp mills. As Gail Helgason discovered, in her story (page 21) on public involvement, it is not likely that the public can stop any of the development, but it may be able to influence the details of the project. For example, the Alberta Energy Company, which is planning a pulp mill near Slave Lake, has decided to install a low-emission waste-wood burner in response to community concerns about smoke.

A forest management review panel, chaired by University of Alberta forestry professor Bruce Dancik, was commissioned early this spring to review all the public input gained in community meetings held throughout northern Alberta at the beginning of the year. Its job was to identify any areas of public concern that were not addressed satisfactorily by the Alberta Forest Service, the forestry department and the forest companies. Its report is due this fall.

Meanwhile, in late July the federal government and the province set up a joint environmental impact assessment (EIA) review panel to hold public hearings on the proposed Alberta-Pacific bleached kraft mill near Athabasca, effectively delaying the start of that project for at least four months.

But none of these processes will address your concerns about the forestry development unless you speak up. If you are reading this in Lethbridge or Calgary or downtown Edmonton, you may think that the boreal forest is not of much concern to you. We hope that this issue will convince you otherwise, and that you will decide to get involved in the process of making sure that the goal of sustainable development, in its broadest sense, is met.

You will notice that we have more than a page of readers' letters this issue. We would like to hear from you on the forestry issue and also on the subject of personal action that we have tackled in the past two issues.

YOU GUYS NEED A HAND?

The editor of Environment Views, *Maryhelen Vicars is a freelance writer and editor based in Edmonton.*

AROUND THE PROVINCE

by Cathie Bartlett

Environment Awards '89

An oil company and a canoe club from Calgary, a University of Alberta research group and a Lethbridge environmentalist are the winners of the third annual Alberta Environment Awards.

Environment Minister Ralph Klein presented the awards during Environment Week '89 activities in Edmonton in June.

"Environmental protection, conservation and the wise stewardship of our province's land, air and water has become a significant priority for all Albertans," Klein said at the awards presentation.

"While all of the award recipients come from various backgrounds, disciplines and different parts of the province, they are brought together here today because of a shared goal — protecting, improving and ensuring that our most treasured legacy, our environment, is passed on to future generations."

Elizabeth Hall of Lethbridge was recognized posthumously in the *individual citizen category* for her lasting contributions in promoting environmental awareness.

Best-known as a nine-year member of Lethbridge City Council, Hall was instrumental in initiating and implementing many environmental achievements through her aldermanic and personal activities.

She played a key role in the Urban Parks Project, under which large areas of the river valley developed into a system of parks. The project stresses the refurbishing of existing parkland and the development of new park facilities.

Hall was an active member of several environmentally-oriented committees and worked with Brownies and Guides, fellow naturalists and leaders of various youth groups.

Thomas Hewitt Sr. and his sons Harold and Thomas Hewitt Jr., of Hewitt Oil Limited in Calgary, accepted the *industry category* award.

The award recognizes Hewitt Oil's efforts in community relations and technology development at its spur gas plant in the Golden Spike area of the County of Parkland. The community opposed the plant when it began producing sour gas in 1968, but with the company's "neighbor first" policy, the plant became a popular and accepted part of the community.

The company sets an industry standard in community relations, in the awards committee's view.

The Golden Spike plant is unique in that it includes a 100 per cent sulphur recovery technology that provides for the conversion of hydrogen sulphide, a byproduct of sour gas plants, to elemental sulphur and water vapor.

The Hazchem Group from the University of Alberta took the award in the *education category*. This group aims at providing an environmentally acceptable way of disposing of research quantities of waste, surplus and spills of hazardous chemicals in the laboratory as a practical alternative to incineration or other methods.

The group has initiated two approaches — a chemical reclamation program and the development, testing and documenting of laboratory disposal methods.

In the chemical reclamation program, chemicals no longer required by their original purchasers are collected, sorted and listed on computer.

Since the program began two and a half years ago, almost 12,000 containers of chemicals with an estimated value of $470,000 have been distributed free of charge to those who can use them, avoiding the need to store and eventually dispose of these materials.

Laboratory workers generate small quantities of waste chemicals, but disposing of these materials in an environmentally responsible way is often a difficult and expensive challenge.

Hazchem itself formed after members of the U of A chemistry department were asked frequently by community members and by university researchers for methods to dispose of such materials and to handle spills of hazardous materials, and a search of relevant literature turned up few detailed and tested methods. Hazchem devised and tested practical disposal methods, which were then documented in detail so workers with minimal experience would be able to perform them.

Hazchem's work, *Potentially Hazardous Chemicals Information Guide*, is available to the public and to schools in Alberta.

The group subsequently prepared another manual, *Hazardous Chemicals Information and Disposal Guide*, which details physical and chemical properties, physiological and health hazards, spillage clean-up and waste disposal procedures for over 200 commonly-used chemicals.

The Calgary Canoe Club won in the *volunteer category* for its annual clean-up campaign along Calgary's rivers and banks.

The campaign started out as a small grass-roots movement by club members concerned about the amount of litter along the city's rivers and banks. For the past 22 years, the club has spearheaded the clean-up, bringing together a wide variety of groups and organizations.

Continued on page 25

Barbara McCord

WHAT IS
The Boreal Forest?

Black spruce, forest fires, black flies and much, much more...

PETER LEE

Wetland vegetation makes up a large and important part of the boreal forest.

Alberta's boreal forest hosts a varied plant and animal life, and it makes a critical contribution to our water supply, air quality and increasingly, the economy.

It's also a place we know very little about. For a lot of people no visual image springs to mind as it would for say, rainforest, the tropical jungle or the desert.

My informal survey of friends and relatives yielded mostly blank looks; the term was vaguely familiar but not really meaningful. Someone who grew up in Ontario's boreal forest and considers it important to the Canadian psyche, however, pointed out that my survey was of "southerners" and of prairie/parkland dwellers to boot.

> *The boreal forest represents last vestiges of suitable habitat for many endangered species.*

Our stories as Albertans are of prairie, badlands, dinosaur bones, the dry southern landscape. We have a connection to this landscape and to the mountains that we don't have to the boreal forest. An alpine meadow probably evokes more meaning for the average Albertan than does the boreal forest.

This gap is a critical one since the boreal forest is the largest natural region in Al-

This huge forest ecosystem makes a critical contribution to global air quality and water balance; forests act as air filters and water reservoirs.

berta, covering the entire northern half of the province's interior.

Lack of access has limited people's knowledge of the boreal forest. There are only three main routes north and a couple of them weren't paved until the late 1970s.

Defining the Boreal Forest

Boreal, from Boreas, God of the north wind, means northern, of the north or the Arctic. The boreal forest is the continuous vegetation belt that stretches across the high latitudes of Europe, Asia and North America. Encompassing such a wide geographical region, this huge forest ecosystem makes a critical contribution to global air quality and water balance since forests act as huge air filters and water reservoirs.

While home to a rich diversity of plants and animals, it also represents the last vestiges of suitable habitat for many endangered species.

In Alberta, the boreal forest is primarily a mixedwood forest of white and black spruce, trembling aspen and balsam poplar with secondary species like lodgepole and jack pine, tamarack and balsam fir, depending on climate and moisture conditions. Almost a third of the region is wetland where black spruce becomes the dominant tree species.

The boreal forest is an important timber resource. White spruce and lodgepole pine are logged for lumber products, as is black spruce, in the foothills boreal forest where, unlike the mixedwood trees, they are of sufficient size for logging. "Yesterday's weed," the aspen poplar, has become valuable for pulp and strandboard. A lodgepole pine/black spruce mix is used for high-grade paper because these trees have longer fibres than does the aspen.

Though it appears to be an endless and rather monotonous expanse of "nothing but trees," the boreal forest actually has a variety of landscapes and vegetation, and is a dynamic ecosystem dominated by the interaction between the main cover types, spruce and aspen. As aspen and spruce compete for the dominant place in the forest, fire plays a key role, keeping it for the most part a youthful forest with little opportunity to reach the stages of maturity and old growth.

CLIFF WALLIS

The Role of Fire in the Boreal Forest

The series of changes in a plant community during its development is called ecological succession. The end product of succession, or the final stable stage of development, is the climax community. A climax community usually has dominant species (white and black spruce in the boreal forest) that create conditions that other species must adapt to. A climax stand has reached the stage in which its dominant species are self-sustaining.

Fire plays a significant part in the natural community dynamics of the boreal forest. The boreal forest has, in fact, been called by some researchers a "disturbance forest," maintained in youth and health by frequent fires to which all species are quite well adapted.

It takes a couple of hundred years or more

L. ALLEN

Frequent fires are a fact of life in the boreal forest.

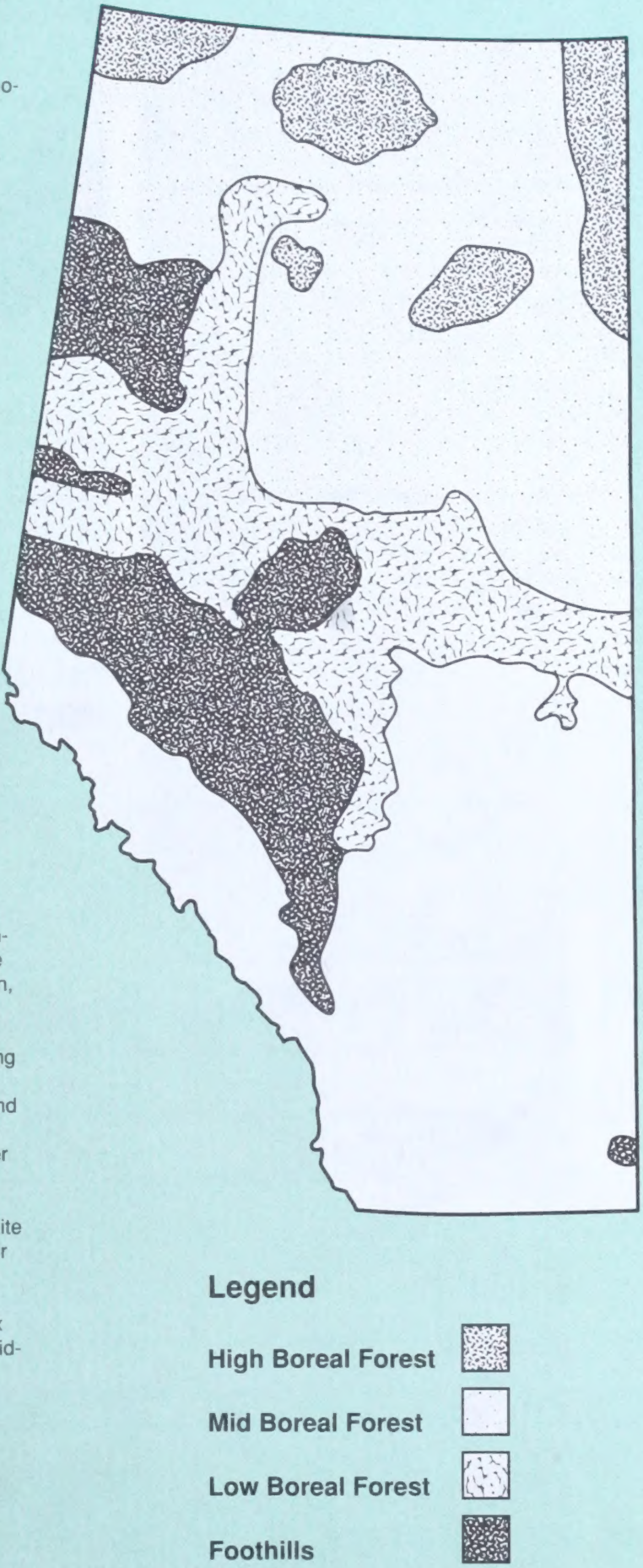
The Boreal Forest Regions of Alberta

High Boreal Forest

Normal sites support closed-canopied coniferous forests of black spruce and jack pine, as well as some paper birch with understories of feathermoss, bog cranberry, blueberry, Labrador tea and lichens. White spruce, balsam fir and trembling aspen are restricted to warmer, moister sites. On drier sites, the black spruce and jack pine stands are more open. Black spruce is the climax species, though frequent fires have restricted its abundance. Rock exposures are treeless, covered instead with rock and ground lichens. Where the land is poorly drained, bog-fen sequences consisting of black spruce, Labrador tea, vaccinium species (bog cranberry, blueberry, bilberry), bog rosemary and cloudberry dominate.

Foothills

This region is a transition zone between boreal and Cordilleran (mountain) vegetation on the lower slopes of the Rocky Mountains. On normal sites, there are mixed forests of trembling aspen, balsam poplar, paper birch, lodgepole pine, white and black spruce, and balsam fir. Trembling aspen and open lodgepole pine stands characterize dry sites, and closed forests of lodgepole pine and white spruce occur at higher elevations. Black spruce and tamarack are associated with poorly drained depressions. White and black spruce, and balsam fir are climatic climax species on upland sites, while the black spruce and tamarack are climax trees on poorly drained sites. Mid- and late-successional stands commonly have feathermoss carpets.



Mid Boreal Forest

North of the Low Boreal belt, this region consists of mixedwood forests of trembling aspen and balsam poplar with white spruce, balsam fir and black spruce occuring in late-successional stands throughout much of this region. Deciduous stands have diverse herb and deciduous shrub understories, but when spruce and fir begin to take over and suppress this vegetation a feathermoss understory begins to develop. Jack pine and black spruce occur more commonly on moderately well and imperfectly drained soils than they do in the Low Boreal Subhumid Region. Cold sites and poorly drained areas are covered by ferns and black spruce-dominated bogs that may have localized permafrost.

Low Boreal Forest

The southernmost belt of boreal forest in Alberta, this region is characterized by deciduous forests of trembling aspen with secondary quantities of balsam poplar, and mixed herb and shrub understories. White spruce and balsam fir are the climax species, but are not well represented because of the frequency of fire. Open jack pine stands occur on dry sites. Water-filled depressions and poorly drained lowlands are vegetated by sedges, willows and/or black spruce. Black spruce is the climax species in these wetlands.

Adapted from *The Ecoclimatic Regions of Canada*, a publication of Environment Canada.

GOVERNMENT OF ALBERTA

Wayne Strong

before a stand reaches the climax state. In the boreal forest, fire usually interrupts the process at an early stage.

As a consequence, most of the forest consists of even-age juvenile stands reflecting replacement after fire. The wetlands, less vulnerable to the effects of fire, tend to approximate more of a climax type of vegetation. Old-growth forests of white spruce/balsam fir, the potential regional climax type, are rare.

> *Lee considers the incremental disturbances (a seismic line here, a well-site there, logging roads everywhere) the biggest threat to the boreal forest.*

Regeneration and the composition of the forest after a fire are quite variable depending on the type of fire and the particular conditions or past history of a site. Regeneration of conifers after a fire depends on the availability of seed, since unlike the deciduous species, they do not reproduce vegetatively by sprouting or suckering. If there is a local seed source, (from unburned crowns or from individual spruce trees protected from the fire by less flammable aspen), or if the fire was a crown fire that did not destroy the small seedlings at ground level, conifers can become more quickly established.

In the long process of succession to spruce dominance in the mixedwood, however, the opportunistic deciduous species like aspen are clearly at an advantage. These species simply resprout after disturbance and in the time required for the conifers to grow tall and dense enough that their shade causes problems for the deciduous species, another fire will have raged through the forest.

Management of the Boreal Forest

The boreal forest is considered much easier to manage than many other natural vegetation types because the ecosystem is adapted to widely fluctuating environmental conditions. In theory this means it can better resist exploitation than can ecosystems adapted to more stable environments. The boreal forest remains, however, relatively unexplored, and poorly understood. The structure of boreal forest vegetation is well documented but much more work is required to gain further understanding of the evolution and ecology of the vegetation, tolerances of species and succession dynamics.

It is this lack of information and understanding that concerns Peter Lee, who heads the Natural and Protected Areas Section in the Public Lands Division of Alberta Forestry, Lands and Wildlife.

GOVERNMENT OF ALBERTA

Peter Lee

"There are very few experts on the boreal forest in Alberta. It's not as appealing a place to work as the mountain and prairie habitats because of the remoteness, harsher environment and bugs."

Wayne Strong, a consulting vegetation ecologist based in Edmonton who has worked extensively in the boreal forest, agrees. To his knowledge, George La Roi, a professor of plant ecology at the University of Alberta, and his students, are the

CLEVE WERSHLER

only academic researchers doing boreal studies in Alberta. Strong also observed, though, that the few boreal specialists in the province (plant ecologists, for example) are not often asked for their input.

"I'm not suggesting that development be halted because of the lack of information. We'll never have enough information, but we need to plan well for development," says Peter Lee. Lee considers the incremental disturbances (a seismic line here, a well-site there, logging roads everywhere) the biggest threat to the boreal forest. The notion that the forest is extremely adaptable to resource exploitation concerns Lee because he worries that it lulls people into a "false sense of security."

"We have no idea what the cumulative effects of various kinds of impact will be. It's not a limitless expanse that can absorb anything you do to it."

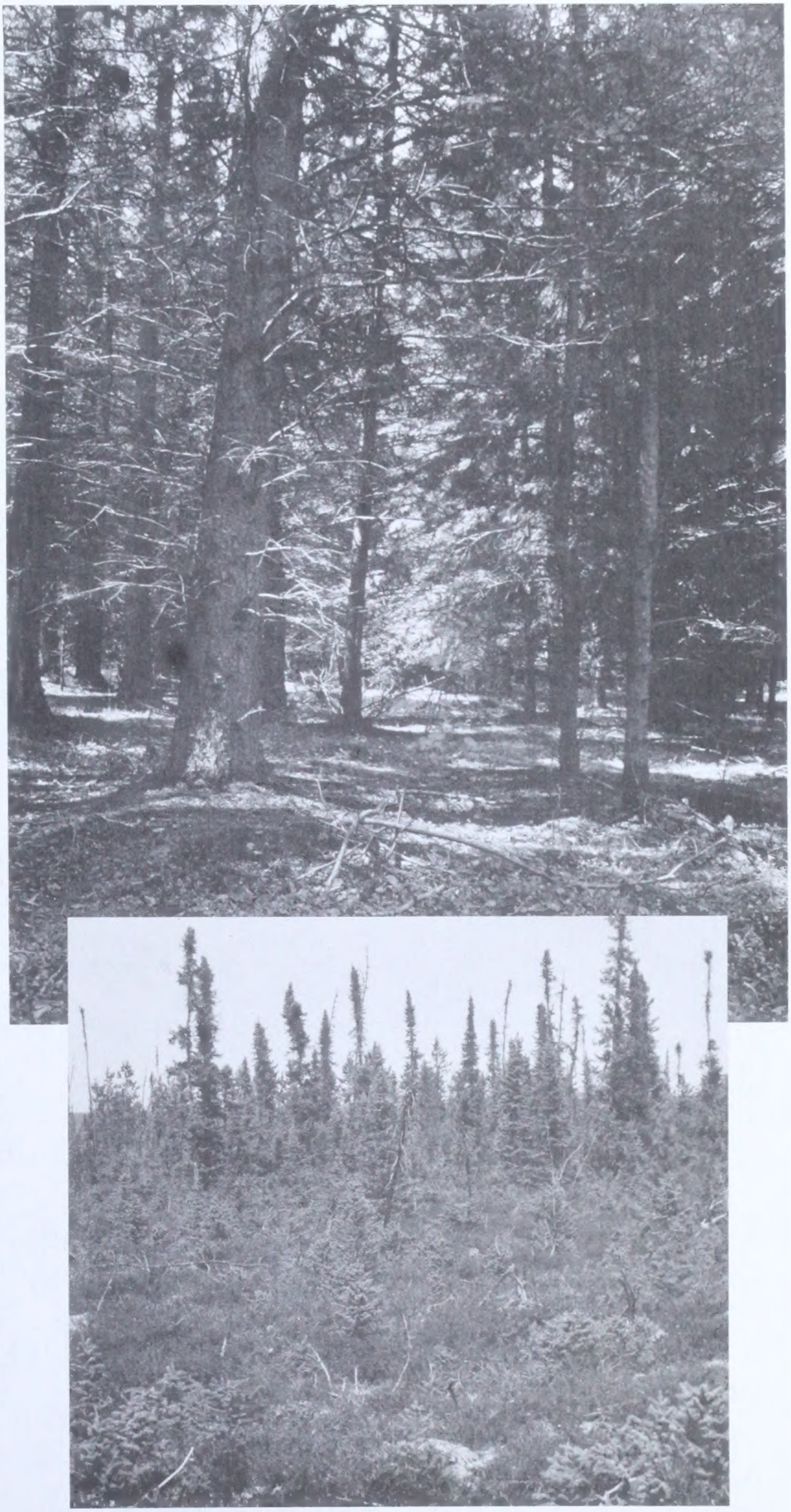
"We have no idea what the cumulative effects of various kinds of impact will be. It's not a limitless expanse that can absorb anything you do to it."

Strong agrees that the cumulative and associated effects are the issue rather than the activities themselves. "I don't think there are severe impacts from cutting. Logging has the same effect as fire except that they take the trees away. There may be more of an impact on the understorey, but studies have shown that the same species come back; it's just a question of abundance. However, overdensity of aspen on clearcuts may be a problem."

"I'm more concerned with the volume of forest and where they may be clearing. The numbers I've heard seem to require a fairly large chunk of land, particularly when a third of it is wetland, part of it jackpine, part too steep to log."

Strong is definitely concerned about the lack of study in the boreal forest in terms of site analysis and classification. Without this information the forest might be managed "all the same without recognizing differences in cover types. They might even save themselves some money in terms of management if they studied sites more."

Greater understanding of the vegetation dynamics (especially the aspen/spruce interaction), water balance, erosion hazard and habitat potential at a site would help



ALBERTA FOREST SERVICE

Stand of white spruce (top), shrubby bog (above).

minimize negative impact and probably help retain or even improve the future quality of the site (i.e. what will grow back) in terms of the timber as well as its other resources.

In Peter Lee's view, the challenge is to "act on information we do have" to ensure wise use of the forest. Lack of specialists and information present practical problems for the professional conservationist trying to locate and then justify areas worthy of protection. The orientation has been to protect significant features rather than representative areas. There are three Ecological Reserves in the boreal forest — Whitemud Falls, Athabasca Sand Dunes, Crow Lake — that protect significant features, rare plant species and some representative habitats. But of the dozens of very small designated Natural Areas in the boreal forest, only three or four sites are north of the Athabasca River. Ninety per cent are in a relatively small crescent around Edmonton, reflecting how little reconnaissance work has been done to "find out what we have in the boreal forest."

Lee feels an option Alberta should consider is some kind of policy similar to that established by the Bruntland Commission on Global Environmental Problems, which has determined that 12 per cent of various world ecosystems be set aside for preservation. "Why not consider writing into FMAs (forest management agreements) that 12 per cent of each may be withdrawn for strict protection — to provide benchmarks, lab areas, areas to protect critical habitat and save species? Let's apply, on the ground, some of these lauded international ideas that have been endorsed by our federal government — while we have time."

"If you cut the forest, moose will move in, but if a road is built allowing access to hunters, the moose will be shot."

Hugh Wollis, a habitat biologist with Alberta Fish and Wildlife, has a very pragmatic outlook:

"Anything done in the boreal forest will have an effect." The aim is to "reduce potential negatives."

Some species of wildlife benefit from man-made changes, so it's a question of accepting that change will have an impact, assessing priorities and finding a balance in objectives and results.

"If you cut the forest, moose will move in, but if a road is built allowing access to hunters, the moose will be shot."

Since more and more of the forest is under FMA, it is a question of modifying forest cutting plans to manage habitat. Fish and Wildlife is consulted by industry through the Alberta Forest Service and provides input to industry concerning the potential impact on wildlife of development projects, including guidelines for avoiding or mitigating those impacts.

It seems vital that Albertans increase their awareness of and appreciation for this northern forest to ensure wise management of its use.

Barbara McCord is an Edmonton freelance writer and editor specializing in technical editing.

Wildlife in the Boreal Forest

Alberta's northern forests contain a wealth of animal life, much of it in habitats still unaltered by man.

There is a rich variety of habitats and these are reflected in the diversity and distribution of wildlife. The boreal forest is a significant habitat for animals that require large expanses of territory to hunt — the wolverine, marten, fisher, lynx, wolf and bear. These animals do not do well when competing with man for resources. The remoteness and productivity of the boreal forest has protected such habitats.

Loss of habitat in southern Alberta has resulted in the disappearance of many species from areas like the aspen parkland to the boreal forest where suitable habitat still exists for species like elk and moose. Their "retreat" there is "because the habitat has been pushed," emphasizes Hugh Wollis, a habitat biologist with Alberta Fish and Wildlife. The boreal forest is a "last refuge" of the whooping crane, bald eagle, peregrine falcon, woodland caribou, American bison, wolverine and other threatened species.

The boreal forest is significant for unique habitats as well. The diversity and productivity of the vast wetlands, in particular, provides staging and nesting habitat for numerous species of waterfowl including the most northern population of American white pelicans.

The rare old-growth deciduous or coniferous stands are critical habitat for raptors, woodpeckers and other species of birds that nest in the hollows and cavities of mature trees. Balsam fir stands support a particularly diverse community of coniferous woodland birds.

But it is the variety of habitats, and their expanse, that makes the boreal forest such a valuable resource for wildlife — both for species that must range widely and those that are locally distributed and dependent on unique and restricted habitats.

ALBERTA FOREST SERVICE

Eric A. Bailey

GOOD FOREST MANAGEMENT
For the Future

Sustained yield and sustainable development aren't the same thing

PETER LEE

Blocks of forest left standing next to cut blocks provide shelter and travel corridors for wildlife.

Sustainable development has become one of the environmental catch phrases of the eighties. On the surface, the concept seems to offer a middle ground environmentalists and developers can stand on to find compromise.

Sustainable development appeals especially to foresters. Most of them believe they have been practising a form of it for at least a couple of centuries. Perhaps for this reason as much as any other, the term has been bandied about freely on all sides in discussions about logging Alberta's northern forests. But do all sides mean the same thing when they talk about sustainable development?

Foresters in some parts of the world have embraced the principle of sustained yield for more than 200 years. Basically, they cut trees at a rate slower than or equal to the rate at which they grow.

> *David Brown, ALPAC: "A forested area isn't just trees. There's water and wildlife to consider and old growth forest is needed."*

"It's a no-net-loss theory," says Cliff Smith, assistant deputy minister of the Alberta Forest Service. "We calculate what the forest is growing, then we don't cut any more than that. It's like a bank account where you only take the interest."

To many people in the forestry industry, sustained yield and sustainable development mean the same thing — the forest and the forest industry will persist virtually in perpetuity barring any natural disaster.

To economists, sustainable development seems to imply finding a level of natural resource development which can be sustained forever. Such development has to be based on renewable resources because you can't perpetuate an industry based on a non-renewable resource like coal or oil. So, trees seem to be the perfect renewable resource on which to base a sustainable industry in Alberta. With wise reforestation practices, Smith says, we can support sustained yields

Cliff Smith

on our forest lands for our economic benefit rather than "letting them be wasted by fire which they will be eventually."

There are those, however, who question the forest service's definition of a forest, who see development in a different light and who have very different views on what, exactly, is to be sustained.

Certainly, a forest is more than a collection of trees growing together. But forestry jargon — productive forest, harvest, yield, rotation, regeneration, stands, cut blocks, sectors, working circles — revolves primarily around economic tree species.

In his Burgess Lane Memorial Lecture at the University of British Columbia in January 1986, Fred W. McDougall, then deputy minister responsible for the Alberta Forest Service in Alberta Energy and Natural Resources, acknowledged that forests have values other than wood fibre and timber production. However, he categorized these values in economic terms only, highlighting benefits in the areas of recreation, wildlife, grazing, agriculture and such non-renewable resource industries as coal, oil and gas.

In the area of wildlife, McDougall focused on hunting, fishing and trapping yet made no mention of the far greater number of animal species not subject to some form of economic "harvest."

He also touched on the use of forest land for recreation and noted that the Alberta Forest Service provides campgrounds and trails on forestry lands. However, he cautioned that "there is concern over the possibility that large areas of forest will be allocated exclusively to recreation and exclude forest management for other benefits."

Forests, however, are ecosystems. Within the boreal mixedwood forest of the northern half of this province there are countless living communities in which soils, climate, drainage and exposure provide varying growing conditions for plants which range from lichens and algae to poplar and spruce, and animals ranging from bacteria and insects to caribou and moose. Each of these species has its own requirements for life and cycles of growth and development which do not necessarily coincide with the optimum rotation interval of a productive forest block.

A rotation is the period between when a stand of trees is cut and when same the area is ready to cut again. The length of time a rotation will take depends on how quickly the trees reach harvestable size. Aspen poplar may take as little as 30 to 40 years to reach commercial size while spruce and pine may take 60 to 80 years.

Modern logging operations in northern Alberta usually employ some form of alternate clear-cutting in strips and patches called blocks. The size of a cut block ranges from five to 100 hectares depending upon the species of tree, the topography, the size of individual stands and the method of reforestation. Blocks of forest left standing next to cut blocks provide shelter and travel corridors for wildlife and act as a base from which many species of plants and animals recolonize the cut block. These "leave" blocks may themselves be cut 10 to 20 years later, depending on the degree of regeneration in cut blocks and the productivity, age, potential market for the trees, and the importance of other possible use for the forest in the leave blocks.

A large forest management unit, however, does not consist only of blocks either cut or waiting to be cut. The Alberta Forest Service reports that areas excluded from cutting in forest management units range from 25 to 70 per cent of the total area. Reasons for exclusion include steep slopes and the proximity to stream banks, as well as economic reasons.

The ground of the cut block may be scarified, mixing the humus with mineral soil to prepare a better seed bed. Aspen usually regenerates by sending up new saplings from the roots of the trees that were cut. Pine may regenerate from seed contained in cones in the logging slash. White spruce must usually be replanted, although some areas can be reseeded naturally from mature trees in the adjacent leave blocks. In all cases, the cut blocks must pass a regeneration test a few years after they have been cut.

McDougall says reforestation programs have been so successful in the last 10 years that "reforestation objectives have now turned from merely establishing satisfactory stocking levels to achieving superior growth. Innovations in site preparation, fertilization, vegetation control, genetics, drainage and thinning are being developed and put into place."

With old growth removed and the less desirable tree species culled from blocks, and new reforestation techniques in place, no one will argue that the new stands of trees that flourish in regenerated blocks contain the same number and diversity of species as the original forest. Some may argue there are improvements in genetic diversity in some cases but it's clear the new forest ecosystems can't be exactly the same as the old ones. The degree to which man should manipulate complex ecosystems is a matter of controversy.

"The boreal forest is not that well under-

Forest production is enhanced by the drainage of wetlands.

stood," says Joan Snyder, an ecologist at Grande Prairie Regional College and chairman of the steering committee for the Alberta Conservation Strategy. In her own study of woodland caribou, for example, she has found that their major food, lichens growing on the ground, have a cycle of succession that lasts over a hundred years. If a stand of trees is cut every 30 to 80 years, such a cycle can never be completed.

Snyder's point is that there may be many such cycles we know nothing about and interrupting them will decrease species diversity in the boreal forest. "I don't see a forest as wood fibre or board feet but as a group of organisms interacting with each other. Species diversity and greater genetic diversity lead to better forest health."

Snyder says, "Professional foresters tend to be biased in their approach to ecosystems and of all the different interest groups, forestry has the greatest impact on the environment of the north. Some members of the industry are taking sustainable development seriously but a lot has to be done before we can plan it properly."

Our perceptions of what constitutes a forest obviously differ. Our interpretations of sustainable development differ even more. What is it we are to sustain? Our Common Future, the landmark report of the Brundtland Commission, made it clear that it was the environment that was to be sustained. If by environment we mean all of the ecosystems and the genetic diversity they encompass, then sustained yield in a forestry operation is not necessarily sustainable development. Especially if you take a broader view of what development may mean.

> *"I don't see a forest as wood fibre or board feet but as a group of organisms interacting with each other."*

"You can use a biological definition of development," says Dr. Bill Fuller, a zoologist who retired from the Univeristy of Alberta after 25 years in the faculty of science and who now lives in Athabasca. "A human develops from a single cell which divides and grows. Later, in adulthood, even though there is no growth, development still occurs. You can distinguish clearly between growth and development even though they often go together."

The Alberta government is encouraging growth in the forest industry but Dr. Fuller and Snyder both say that growth is not the only kind of development possible in the industry overall. They think more effort should be put into recycling used wood fibre to lessen demand on forest ecosystems. Snyder also says the fostering of a paper manufacturing industry in this province would bring greater economic returns per unit of pulp than does shipping unmanufactured pulp out of the province.

Dr. Fuller also observes that sustainable development could mean that we should provide for the sustained development of forest ecosystems themselves.

"Development could also be defined as succession. You start with a small lake that gradually fills in to become land, along come pioneer plants, pioneer animals, conditions change, other kinds of plants and animals arrive and eventually you get a characteristic assemblage representative of a climax ecosystem. If you clear it off or burn it off, it happens again."

Dr. Fuller says modern forestry cuts that process short. "One thing that will disappear, even on a 60-year rotation, is very old forest. Cavity nesters, for example, are absolutely dependent on old growth as are woodland caribou, so these have to be specifically preserved."

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It's natural for forest ecosystems to develop over time. Cutting and recutting on a 60-, 70- or 80-year rotation freezes these partial ecosystems in a cycle of perpetual birth and youth. Allowed to age and mature, though, trees reach a point where less and less of their energy goes into growth and more and more goes into just maintaining their size. When a forest reaches this stage, it is referred to as "unproductive" by foresters.

"Priorities are wrong when high forest yield is the foremost goal, the bottom line. The top line, the route to sustainability, is the diverse, healthy, beautiful forest ecosystem," writes Dr. Stan Rowe, professor emeritus of plant ecology at the University of Saskatchewan and author of *Forest Regions of Canada*, in the February 1989 issue of the *Forestry Chronicle*.

Dr. Rowe cites the World Conservation Strategy which declares that the genetic wealth and diverse ecological processes of ecosystems must be safeguarded and then he asks, "Is this a priority of forest managers?"

He also refers to a study on the effects of climate change on the boreal forest which

Large cutblocks such as this are becoming less common.

states that one of that forest's greatest values may be the amount of carbon it ties up which might otherwise be in the atmosphere contributing to the greenhouse effect. Remarks Dr. Rowe ironically: "What a repugnant thought, that the greatest value of a forest is just being a forest, rather than potential pulp and two-by-fours."

David Brown, a professional forester with Alberta-Pacific Forest Industries agrees that there's no such thing as an unproductive forest. "A forested area isn't just trees, there's water and wildlife to consider and old growth forest is needed." However, he says, the question really is how much.

While negotiations on the final size aren't complete, Alberta-Pacific's forest management agreement (FMA) in northeastern Alberta will likely include cutting rights to more than 70,000 square kilometres of forest.

"Our management rights are granted to us to provide stable employment in the area. We can only do that with a sustained supply from a renewable resource," Brown says.

Brown doesn't like the term sustainable development because he feels it isn't clear. "If you add integrated resource management to sustainable yield, you get environmentally sustainable economic development, which is what I prefer to call it — a successful integration of the environment and the economy."

ALBERTA FOREST SERVICE

Intensive management includes thinning of young trees.

Brown echoes a comment made by McDougall and many other foresters: the people of Alberta have to tell them what kind of forest they want and they will find ways to achieve it. The Alberta Forest Service stresses that only 20 per cent of the boreal forest will be cut within the next century and Brown says Alberta-Pacific will only cut about half of the area of its forest management agreement. While most of the portion that won't get cut is black spruce bog which is difficult to reforest and marginally productive, Brown notes that many provisions have been made to protect certain wildlife habitat, stream quality and genetic diversity. But is that enough?

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harvesting

"The key is to get some grass-roots participation in the process, some public input, input from local trappers and people who have some stake in the resource," Brown says. "The whole issue is emotional and that's why we have to involve the people concerned with it."

So, all sides agree on this much at least: the public should decide. But how will the public interpret sustainable development if the experts can't agree? How will the predominantly urban population of Alberta weigh the issues in the most sparsely populated and remote regions of the province?

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"How much of an ecosystem we keep is really the question. How much do we need to survive? Society will have to decide this," Snyder says.

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Or, according to Dr. Rowe: "Sustainable development, sustainable economic development, depends on a sustained ecosphere, and we had better start asking the growth promoters and not a few forestry professionals, 'How much is enough?'"

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stood,” says Joan Snyder, an ecologist at Grande Prairie Regional College and chairman of the steering committee for the Alberta Conservation Strategy. In her own study of woodland caribou, for example, she has found that their major food, lichens growing on the ground, have a cycle of succession that lasts over a hundred years. If a stand of trees is cut every 30 to 80 years, such a cycle can never be completed.

Snyder’s point is that there may be many such cycles we know nothing about and interrupting them will decrease species diversity in the boreal forest. “I don’t see a forest as wood fibre or board feet but as a group of organisms interacting with each other. Species diversity and greater genetic diversity lead to better forest health.”

Snyder says, “Professional foresters tend to be biased in their approach to ecosystems and of all the different interest groups, forestry has the greatest impact on the environment of the north. Some members of the industry are taking sustainable development seriously but a lot has to be done before we can plan it properly.”

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Claire Stirling

PULP MILLS
In Alberta's Boreal Forest

What price are we willing to pay for economic diversity?

D. GRIFFIN

Procter & Gamble's bleached kraft pulp mill near Grande Prairie.

The prospect of having seven pulp mills in operation in northern Alberta has Albertans divided.

It is the largest diversification project the province has seen since the oil boom, and already the government has endorsed it to the tune of $1 billion in publicly-funded debentures and guarantees. As well, the province has promised to spend $160 million on infrastructure, including roads, bridges and railroads. The objective is a return on the investment of almost 12,000 directly or indirectly related jobs.

There are two main issues: are the pulping processes environmentally sound; is the size and scale of the development appropriate?

Friends of the North is the environmentalist group representing the many smaller groups concerned about pulp mill development in their area. The impact of five pulp mills on the Athabasca water basin and two on the Peace water basin is of great concern to the organization. They feel that the bleached kraft process will soon be outdated, that health concerns are not addressed properly and that the environmental impact assessment (EIA) process is inadequate. They want to protect their wilderness areas, and they question the mills' capabilities to ensure this happens.

But industry and government assert that if there is strict adherence to the regulatory controls, the environmental protection standards and ever-improving technology, the proposed projects will not jeopardize the environment. Alberta has Canada's most stringent standards with respect to technology requirements for both in-plant operations and effluent treatment. "Leading edge technology," also known as best available technology, must be implemented by Alberta's pulp and paper mills as they are built or expanded.

There are two main issues being debated: are the pulping processes themselves environmentally sound, and is the size and scale of the development appropriate?

Millar Western chemi-thermo-mechanical pulp mill near Whitecourt.

ALBERTA FOREST SERVICE

Pulp Mill Technology

Currently, there are two kinds of pulp mills operating in Alberta — Weldwood Canada Ltd. in Hinton and Procter and Gamble near Grande Prairie both operate bleached kraft pulp mills, and Millar Western has a chemi-thermo-mechanical pulp (CTMP) mill in Whitecourt. What distinguishes a kraft from a CTMP mill is the way the wood fibres are separated.

Wood is made of a mass of fibres held together by lignin, a sort of natural glue. The papermaker needs these fibres to float freely in order to make a flat smooth piece of paper.

Chemi-thermo-mechanical pulp mills separate the fibres by soaking the wood chips in a sodium sulphite solution for about 15 minutes, then refining them between two counter-rotating disks with roughened surfaces. The grinding weakens and shortens the fibres, but by softening the lignin with the chemicals, less damage is done to them.

Some products made from CTMP are fluff for diapers, newsprint, tissue, and the middle plies of cardboard.

Bleached kraft pulp mills use a different approach to separating the fibres from their lignin bed. In these mills, the woodchips are cooked under pressure in a digester at high temperatures, with sodium hydroxide and sodium sulphide. These chemicals dissolve the lignin. At the end of a cooking session, a mass of fibres floats freely in black cooking liquor. The fibres are then washed, and the black cooking liquor, which contains the used chemicals and the dissolved lignin, is recovered and recycled.

Kraft pulp is the strongest pulp produced because the fibres have not been weakened or shortened by mechanical refining. At this point, the pulp can be made into such products as cardboard boxes and brown paper bags.

The brown pulp is then bleached. This has two purposes. The first is to increase the brightness, or whiteness, of the paper product. White paper is needed for printing bright, clear pictures, for example. Compare the accuracy of the color in a newspaper picture with that of a magazine picture.

The second function of bleaching is to remove shives, clumps of three or four fibres stuck together. These can be seen on brown paper bags as dark brown, bumpy spots. The bleaching removes lignin and improves the uniformity of the paper.

It is from bleached kraft pulp that fine paper products are made. Newsprint is made from a blend of kraft and CTM pulp.

Chemi-thermo-mechanical pulp can also be bleached, but it still does not make a strong enough paper for packaging materials, paper bags, fine papers, or papers that need a coating (magazine paper, for example).

One of the problems with bleached CTMP paper is that it still contains lignin. Exposure of the lignin to sunlight makes the paper turn yellow and become brittle. This is most commonly seen with newspapers,

Effluent pond at Procter & Gamble pulp mill, Grande Prairie.

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but is not acceptable for anything that is meant to last.

CTMP mills also have an environmental problem with lignin, as none of it is removed when the woodchips are mechanically ground. When the pulp is washed, the resin acids and the fatty acids in the lignin are found in the water effluent. These are highly toxic, but the effluent levels can be reduced to sublethal levels, according to a 1987 Environment Canada report, *Aquatic Toxicity of Pulp and Paper Mill Effluent.*

Pulp Mill Effluents

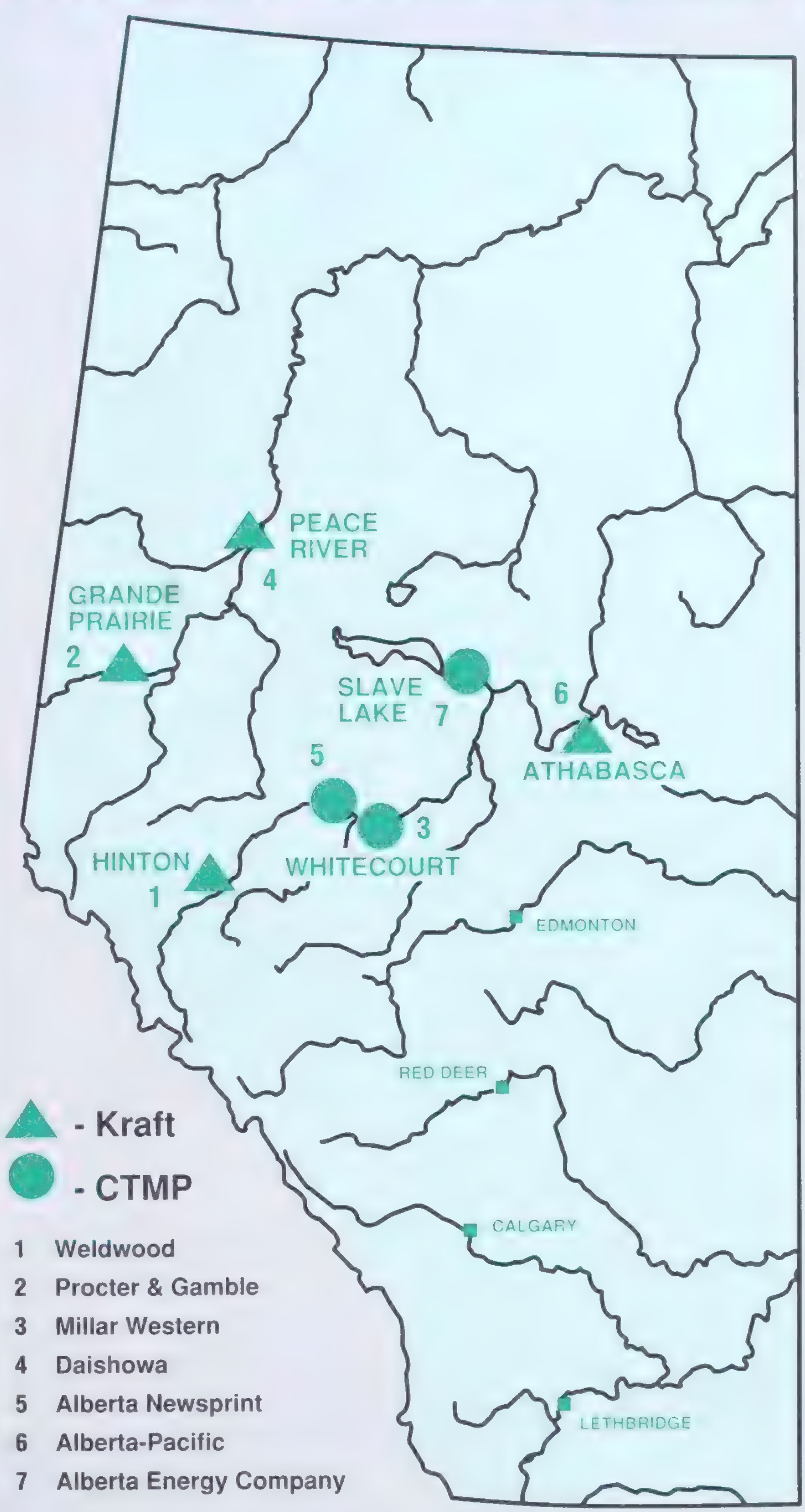
Alberta pulp mills are required to have primary and secondary effluent treatments, which significantly reduce the biological oxygen demand (BOD), a measure of oxygen consumed during the breakdown of waste matter. The primary treatment is the first treatment of the effluent to settle and remove suspended solids. The secondary treatment is an aerated lagoon in which oxygen is blown through the effluent and nutrients are added to aid the bacterial breakdown of the organic material to lessen the demand on the river for oxygen. This is also known as biotreatment.

> *Prince George, with its kraft mill, has a mortality rate 34 per cent higher, and a cancer rate 46 per cent higher, than the rest of the province.*

"Biotreatment normally reduced resin acid concentrations to sublethal levels in effluents from all mills," according to the Environment Canada report. When the pulp is not bleached with chlorine, the resin acids usually decreased by 90 per cent with biotreatment. When the pulp is treated with chlorine, the resin acids pick up chlorines, becoming chlorinated resin acids. These are more resistent to breakdown by biotreatment. Because CTMP mills use hydrogen peroxide instead of chlorine to bleach the pulp, a significant amount of acid can be removed.

Kraft mills remove almost all the lignin in the digester. Very little resin acids and fatty acids are found in the effluent because most is removed by the black cooking liquor. The black liquor is recovered and the spent pulping chemicals are recycled. The wood residues, containing lignin, are burnt, emitting some sulphurous pollution. Otherwise, because the chemicals are recycled, this

New Pulp Mill Development in Alberta



Kraft and Chemi-thermo-mechanical Pulp Mill Technology

	Woods used	**Yield** (% of wood converted to pulp)	**Process**	**Water use**	**Strength of pulp**	**Final products**	**Technology**
Kraft	Softwood and hardwood	45 - 55 per cent	Wood chips are cooked under pressure with sodium hydroxide and sodium sulphide ($NaOH$ & Na_2S) for .5 hour and 2.5 hours.	New mills typically use between 50 and 100 cubic metres of water per tonne of pulp.	Softwoods: high to very high. Hardwoods: medium to medium high.	Newsprint, highest printing grade, magazine & papers, bond, writing.	New mills in Alberta include extended delignification, oxygen delignification, and chlorine dioxide substitution in the first stage of the bleaching sequence. Conventional six-stage bleaching sequences are modified. All of the above minimize chlorine use. Kraft utilizes in-plant recovery systems to reduce effluent strength.
Chemi-thermo-mechanical	Softwood and hardwood	88 - 92 per cent	Wood chips are impregnated with sodium sulphite (Na_2SO_3) up to15 minutes and refined by mechanical abrasion.	Typically use between 20 and 25 cubic metres of water per tonne of pulp.	Higher than thermo-mechanical pulp (TMP), lower than kraft.	Newsprint, tissue/towel, bleached board, fluff.	CTMP is a new type of mill and the process involves mechanical refiners. CTMP uses sodium sulphite and sodium hydroxide. CTMP produces a high strength effluent requiring primary and secondary wastewater treatment. No chlorine is used in this process.

step is not hazardous to the environment.

The concern that environmentalists have with the kraft mills is primarily with the chlorine bleaching stage, where dioxins and furans are formed. Dioxins are a family of 75 related chemical compounds called polychlorinated dibenzo-p-dioxins. Furans are a family of 135 related chemical compounds known as polychlorinated dibenzofurans. They are two benzene rings attached together by one (furans) or two oxygens (dioxins). This molecule can have a number of chlorines attached to it, creating the various dioxins and furans.

Not all dioxins and furans are the same. Some are 10,000 times less toxic than the most toxic dioxin, 2,3,7,8-tetrachlorodibenzo-para dioxin (2,3,7,8-TCDD).

Dioxins form in the bleach plant as a result of contaminants present in the defoamers used during washing the pulp, according to a March 1989 publication by the Pulp and Paper Research Institute of Canada (PAPRICAN). The defoamers contain unchlorinated precursor compounds which pick up chlorines to form the toxic dioxins and furans. Some defoamers contain more precursors than others, and the industry is beginning to use those with the lowest levels. But the precursors also exist in the wood itself.

Furthur research by PAPRICAN presented in Montreal at the end of January, 1989, finds that by substituting combinations of chlorine and chlorine dioxide in the bleaching process, fewer dioxins and furans are formed. Chlorine dioxide substitution reduces the amount of free chlorine available to form these toxic chlorinated compounds.

Up to 70 per cent chlorine dioxide substitution in the first stage of the bleaching can be made, says Alberta Environment. This is one of three new technologies required at Alberta kraft mills to reduce dioxin formation. The others are extended delignification and oxygen delignification.

Extended delignification removes more lignin by cooking the pulp in the digester for longer at a higher temperature.

Oxygen delignification is the new step between extended delignification and bleaching. It removes more lignin and thus reduces the amount of chlorine required for bleaching.

The thrust of these three technologies is to reduce the amount of chlorine used in the kraft process so that fewer dioxins are produced.

Organic loading of the river by the mills is also a major concern. Maintaining acceptable oxygen levels in the river water and mill effluent is essential to aquatic wildlife. Organic material from the mills requires oxygen to decay (biological oxygen demand, or BOD), but the fish need oxygen to live. When the amount of organic material dumped in the river exceeds the river's capacity to provide oxygen to decay it, fish and other aquatic animals will die.

Jim Snidal, Athabasca river basin planner for Alberta Environment, says "the organic loading from one medium-sized mill like Millar Western is equivalent to the organic loading from the treated effluent of a city of 300,000." It is his department's job to find out if the Athabasca and Peace river basins can support the loading of the equivalent of about three and a half Edmontons.

Mills cause an oxygen sag in the river downstream by the BOD of its effluent. The river replenishes its oxygen supply by the contact of the surface water with air, but this cannot happen in the winter. With the

ice cover and the significantly decreased flow of the Athabasca in the winter, the mills will use a higher percentage of the dissolved oxygen.

To help evaluate the project, the planning division of Alberta Environment is using a water quality model developed by the Calgary consulting firm Hydro Qual. The model uses existing data on mill effluent to predict the impact of the new pulp mills on the river. This will help determine if there is a potential threat to fish and other aquatic life.

The two main effluent concerns of Alberta Environment are dioxin and BOD levels. Not enough is currently known to give a definitive answer regarding the cumulative effects of low levels of dioxins on humans and wildlife. The Friends of the Athabasca don't want to find out at the expense of their river. They want studies done before extensive damage is done.

Air Quality Concerns

Mills must comply with the Clean Air Act, as well as the Clean Water Act and Water Resources Act. Total reduced sulphur (TRS), sulphur dioxide, particulates and water vapor are the air emissions of concern. To reduce the odor, low-odor recovery boilers were developed and are a standard in all mills now. They effectively reduce odorous compounds.

Health problems can be caused or exacerbated by increased levels of TRS, says Dr. Robert Dykes of North Hawke medical clinic in Prince George, B.C. Upper respiratory tract problems include eye irritation, sinusitus, and sore throats. Lower respiratory tract problems include asthma, bronchitis and emphysema. Cardiac problems and impaired pulmonary functions are also high on the list.

"Prince George, with its kraft mill, has a mortality rate 34 per cent higher, and a cancer rate 46 per cent higher, than the rest of the province", says Dykes. Using these statistics, the public health office recommended that an air quality index level be published daily in the Prince George Citizen.

Water vapor emissions are not often thought of as a problem, but Dr. Gerald Bonham, Medical Officer of Health in Calgary, explains that in areas with stagnant air bodies, the water vapor accumulates in the form of a fog bank and obstructs the sunlight for most of the morning during the winter. He observed this in Port Alberni when he worked in B.C. in the 1960s. In Kamloops, where winter fog was almost unknown before the building of a kraft mill, the valley bottom airport is frequently closed because of heavy winter fog.

"I think that in terms of quality of life there's no question that it's impaired by a mill," commented Bonham, with reference to water vapor and sunlight.

Regulations and Controls

There are various regulatory controls and environmental standards that must be followed. The process begins with the preparation of an environmental impact assessment (EIA), which outlines existing conditions, predicted impacts on the environment and how the company will deal with them, followed by an application for a permit to construct. The company usually contracts consulting firms to prepare the EIA, which must also include community consultation. The EIA is reviewed interdepartmentally to check for deficiencies.

"One of our concerns is the inadequacy of the EIA process," says Dr. Bill Fuller, a member of Friends of the Athabasca and professor emeritus of zoology at the University of Alberta. The EIA studies don't start at the same time as the engineering and financial planning, for example. Dr. Fuller is also concerned that the minister does not have to give the public any reason for his decision to licence a company.

When apermit to construct is issued, it includes conditions under which the department is prepared to allow the project to be built, and the licence to operate includes the detailed operating conditions and standards.

Alberta-Pacific Forest Industries Inc., the proposed new kraft mill near Athabasca, compiled a particularily weak EIA, says Fuller. In the 546-page report, one and a half pages are given to describe the impact on aquatic wildlife, a subject of great concern to local residents.

Alberta Environment's Bob Stone says the Alberta-Pacific EIA review board, an interdepartmental body, will review the EIA for deficiencies. If the EIA does not include adequate consideration of fish and wildlife concerns, the company will have to address this by further study.

Speaking to a workshop on bleached kraft pulp mills held in Athabasca in March, Dr. Stan Rowe, a plant ecologist and author of *Forest Regions of Canada*, echoed many of Dr. Fuller's concerns.

"Alberta's EIA process is one of the weakest in Canada, judged by criteria set by the Canadian Environmental Advisory Council.

"In Alberta, the public has no input to the initial screening criteria by which decisions are made as to which projects are evaluated and which are not. The public has no input to deciding on the scope of any project for which the minister, at his discretion, may require an EIA. This explains why, for example, the present EIA pays little attention to the effects of the mill on the forest ecosystems that will support it.

Once the EIA is completed and approved, the company is granted a permit to construct. This includes regulations concerning emission and effluent standards. When the company receives a licence to operate, the mill can become fully operational. Included in the licence are detailed air emission and effluent standards, as well as reporting requirements for the department.

The licences are given for a set amount of time, after which the standards in the agreement can be altered.

The Clean Air, Clean Water and Water Resources acts are the lowest standards set for the mills. But depending on the individual project, more stringent requirements can be made.

The Alberta government retains the right to shut down a mill if any part of the licence is violated. In January and February of this year, Alberta Environment issued control orders to Weldwood and Millar Western respectively because they had breached a part of their agreement.

The pulp mills in northern Alberta must comply with the standards set by the government. The standards become more stringent as research shows where improvements must be made and technology is developed to cope.

But Friends of the North and other environmentalists are not convinced that current knowledge and technology are good enough to ensure that we can maintain the complex forest ecosystems of northern Alberta.

Claire Stirling is a Carleton journalism student working in Edmonton for the summer.

Paper Alternatives

There's no disputing the power of the consumer. Environmentalists in Europe have for a number of years been able to express their concerns with their shopping carts. They could choose from a range of "green" products, those that, in production or disposal, have a minimal impact on the environment.

Just as we can, they can choose recyclable containers, non-toxic cleaning products, pump sprayers instead of aerosol, etc. But they have had the advantage of being able to choose a full line of unbleached paper products. In most parts of Canada, unbleached toilet paper, stationery and coffee filters have been hard, or impossible, to find.

But that's changed in recent months. Recycled and unbleached paper products are becoming more common on the market. In my Edmonton home, for example, we've switched toilet paper brands, to one made from 100 per cent recycled paper, now available from The Real Canadian Superstore.

Because suppliers have now made a range of recycled papers available to Alberta printers, *Environment Views* will be printed on recycled paper, beginning with this issue.

Responding to numerous letters from customers and to polls showing that the environment is the number one concern of Canadians, Superstore is developing the G.R.E.E.N. line — a variety of environmentally friendly products. The unbleached or recycled paper products include Swedish coffee filters, toilet tissue, diapers and paper plates.

Consumer response has been "extremely positive" since Superstore began to market the G.R.E.E.N line on May 31, says David Ryzebol, the director of public affairs for Superstore.

Canada Safeway has packaged eggs in recycled-paper cartons for a long time, says Sherrie Dutton, national communications manager for Canada Safeway. Their shipping cartons are also recycled. "Safeway makes an effort to sell environmentally friendly products but because we carry mainly national products we can't package them as environmentally-friendly the way Superstore can with their in-house (G.R.E.E.N) line."

Horne and Pitfield president Wayne Wagner says their IGA stores carry egg cartons made from recycled paper, but they do not carry unbleached or recycled paper products, and have no plans to do so in the future.

Brian Killeen of Greenpeace in Vancouver says they get "about 25 or 30 calls a week from people asking where they can buy unbleached paper products." Greenpeace has been generating interest by showing unbleached products from Sweden like the ones sold by Superstore.

"There are no unbleached paper mills in Canada," says Killeen. "All our alternative paper products have to be imported from either Europe or the United States." He says this is because the Canadian paper companies believe there is no market for unbleached products, so they do not manufacture any.

Penny Marshall and Sandy Day of High River turned their desire to help the environment into a business venture. Just before Christmas, they founded the earthcycle paper corporation and now sell unbleached and recycled papers. They purchase various sorts of paper from six American paper companies, ranging from 100 per cent recycled paper to computer/copier paper containing 50 per cent virgin wood pulp. Earthcycle is "a way to take direct action," says Marshall. Unbleached and recycled papers are "something wewould like to see available, as well as use ourselves."

Compared to the original paper making process, recycling paper is much better for the environment and is more economical. "It costs much less to recycle paper than to manufacture it," says Killeen. Those are not the only savings made. Recycling a tonne of paper, about two dump-trucks full, saves between 15 and 20 trees and 1000 cubic metres of pulp rinse water. The electricity saved could run an average home for six to eight months.

Conservation is still of prime importance because even recycled paper carries environmental costs. The effluent from the de-inking process can be highly toxic because of trace metals in the dyes used for coloring and printing. The chemicals used to remove the ink from the paper can also be quite toxic.

But there are ways to reduce the toxicity of the effluent. Vegetable-based dyes can be used and less toxic chemicals can be employed in the removal of ink from paper, Killeen says.

The Quebec and Ontario Paper Company's plant at Thorold, Ontario, uses a non-chlorine process for de-inking newspaper and magazine paper. The pulped paper is put into a flotation bath of hardened water and soap. Air is pumped through, and the ink particles adhere to the soap foam caused by the movement of the air through the pulp and water.

Because no chlorine is used, the resulting paper is not white enough to be used for fine papers, but is usable for newsprint.

Although there are some problems associated with recycled paper, it is still preferable to making new paper. The label on my package of Superstore bathroom tissue reads "every year in Canada we destroy a forest the size of P.E.I. to produce paper and paper products. By buying bathroom tissue and other products made from 100 per cent recycled paper, you are saving our natural forests." It seems that recycled products give comparative shoppers more than just a good price.

Claire Stirling

Sandy Day (l.) and Penny Marshall

Gail Helgason

GETTING THE PUBLIC Involved in Forest Management

And getting forest companies to listen to our concerns

GOVERNMENT OF ALBERTA

Betty and Ian Sewall's back country farm is located close to the planned ALPAC mill.

Fifteen years ago, Betty and Ian Sewall sat down with a map of Alberta — and one purpose firmly fixed in their minds.

"We wanted to choose what we thought would be the best environment in the province, both mentally and physically, to raise children," explains Betty.

The Sewalls thought they'd found their dream home in 1974 when they bought a farm near Grassland, 32 kilometres northeast of Athabasca in northeastern Alberta. The family of six enjoyed fishing and boating on the nearby Athabasca River. Ian raised cattle part-time, while pursuing a full-time career in curriculum development for native studies, a specialty that had already led the family to such remote Alberta points as Janvier, Nose Creek and Garden River.

> *"We've been told there may be as many as 600 trucks a day on the road going by our farm"*

Then last December, the Sewalls heard news that rocked their rural dream. Construction of the world's biggest single-line pulp mill had been approved in principle in the Athabasca area. The proposed site? Less than two kilometres from the Sewall farm.

It was a galvanizing moment for Betty. Along with many other Albertans affected by major forestry initiatives in recent years, she became determined to participate in development decisions involving the $1.3-billion mill proposed by Alberta-Pacific Forest Industries Inc.

"The project woke us up again," explains

Betty. "We feel we have a responsibility not to sit back and criticize, but to try to participate in whatever political processes we can."

The Sewalls joined about 25 neighbors to form the Prosperity Environmental Group — a loosely structured clutch of concerned citizens. "We decided it was our responsibility to become as informed as possible," says Betty. "We held our own meetings and invited guest speakers. For example, we wanted to know what happens to soil as a result of these emissions."

"After about 25 phone calls throughout western Canada and the United States, we find out there doesn't really seem to be research pinpointing pulp mills and agriculture."

The group's concerns about major new forestry projects are shared by many Albertans. Bob Stone, head of the Environment Impact Assessment (EIA) Review Branch of Alberta Environment, says the issue of public involvement in forestry management decisions has definitely gained profile with the announcement of each new forestry project in the province.

That higher profile is partly due to the sheer number of new forestry initiatives. Projects completed over the last two years or now under way in Alberta include the Athabasca pulp mill, a $168-million chemi-thermo-mechanical pulp (CTMP) mill to be constructed by Alberta Energy Company Ltd. near Slave Lake, a $500-million bleached kraft pulp mill in Peace River being built by Daishowa Canada Co. Ltd., a $393-million expansion by Weldwood of Canada Ltd. of its bleached kraft pulp mill at Hinton, a $360-million newsprint mill by Alberta Newsprint Co. Ltd. in Whitecourt, a $205-million CTMP mill by Millar Western Pulp Ltd. and a $365-million expansion of Procter & Gamble's pulp mill and sawmill at Grande Prairie.

Alberta Environment has recently announced a system of financial compensation for interveners.

"There wasn't much of a public reaction to Millar Western," says Stone. "With Alberta-Pacific, it's been a 180-degree turn. The community issues are very important."

GOVERNMENT OF ALBERTA

Con Dermott

For 39-year-old Betty Sewall, the Alberta-Pacific proposal reactivated an environmental concern latent for many years. As a student at the University of Lethbridge in the 1960s, she helped organize the city's first recycling project.

"It was the immediacy of this project that woke me up from my comfortable pew," she says. "We've been told there may be as many as 600 trucks a day on the road going by our farm."

The first step for Sewall and her group was to become familiar with the project's Environmental Impact Assessment (EIA) process. Alberta Environment requires EIAs on most major resource development projects.

While the scope of an EIA varies from project to project, the province requires companies to identify existing conditions in any area in which a major forestry project is planned. They are also required to assess possible environmental impacts and outline how the company would deal with them.

The proponent must announce that an EIA has been requested, and that there will be a process for public participation. Usually this step includes conducting a number of public meetings and receiving briefs from the public.

"This strong emphasis on public participation is known in theory as a 'community-based' impact assessment approach," says Stone. "While a 'community-based impact assessment approach' is not defined in the Alberta guidelines, it means involving affected community residents in each stage of impact assessment." When the necessary information has been collected, the company is required to prepare a report and inform the public that the document is ready for review. This gives the company the opportunity to discuss the report with the public before submitting it to the department.

DAVE MUSSELL

Four EIAs involving forestry have now been completed — for Weldwood Canada Ltd., Millar Western Pulp Ltd., Alberta Newsprint Co. Ltd. and Daishowa Canada Co. Ltd. The EIA process is under way for the Alberta-Pacific project at Athabasca and the Alberta Energy Company project at Slave Lake. (An EIA has not yet been requested for the Procter & Gamble expansion at Grande Prairie, but one will be required.)

The establishment of an EIA review board to hold public meetings on the Alberta-Pacific project has also been announced. This board will include at least three individuals from the project area. While further details on the role of the board are still being worked out, Stone says its establishment indicates a new direction in public participation. "It is breaking new ground, because the old system didn't have a formal mechanism (for public participation) for the non-energy sector."

Another new direction is in the works. Until now, interveners have not been compensated for the financial cost of public involvement in the EIA process — assistance the Energy Resources Conservation Board (ERCB) provides to interveners in public hearings involving oil and gas projects. Alberta Environment recently announced that some system of compensation will be provided in the future, although details have not yet been worked out.

Late in August, the environment minister pledged funding for groups and individuals who want to participate in the public hearings, and he said he would give "first priority" to assisting the Prosperity group, who had requested about $50,000.

Upon successful completion and approval of an EIA, a Forest Management Agreement (FMA) is negotiated with Alberta Forestry, Lands and Wildlife. This agreement, which defines specific forest management obligations the company must undertake, is for a 20-year term and is renewable.

"Normally an FMA is put in place when companies are planning major integrated

More Public Participation In ALPAC Decision

In late July, the federal government and the province set up a joint environmental impact assessment (EIA) review panel to hold public hearings on the proposed Alberta Pacific (ALPAC) bleached kraft pulp mill near Athabasca. Though the ALPAC project is the main focus of the review, the panel will look at the cumulative effects of all mills on the Peace-Athabasca river basin, proposed and existing.

The federal-provincial panel is in addition to the Forestry Management Review Panel, appointed by the province last March and chaired by Dr. Bruce Dancik, which is examining public concerns about timber harvesting practices for all new forestry projects in Alberta. The Forestry Management Review Panel did not hold public hearings, but is working from a report prepared by Concord Scientific Ltd. on issues aired at provincially-scheduled public meetings across northern Alberta last spring.

Negotiations to strike the federal-provincial review panel were started because both the federal and provincial governments have jurisdiction to require an EIA on the ALPAC project through their separate review processes. This could have led to duplication of effort and expense, and conflicting decisions on whether to allow it.

The two governments agreed that decisions about the ALPAC project were mostly within Alberta's jurisdiction, which is reflected in the composition of the panel — two federal versus five provincial appointees. In its terms of reference, the panel is to review the environmental impact of the ALPAC project, including the cumulative impacts of mill effluents on the Peace-Athabasca system and the impacts on areas of specific federal responsibility — fisheries, navigable waters, Wood Buffalo National Park, water quality in the Northwest Territories, and timber harvesting on Indian reserve lands. The panel will also assess how well the ALPAC project meets the concerns of local citizens.

The panel is holding hearings in Athabasca, Prosperity, Lac La Biche, Fort McMurray, Fort Smith (NWT), and other communities. Hearings will begin in mid-October. In late Augus, Environment Minister Ralph Klein pledged funding for groups and individuals who want to take part in the hearings.

The panel's public information line is 422-2549.

The panel is chaired by Gerry DeSorcy, chairman of the Energy Resources Conservation Board. The other provincial members include Chief Jim Boucher from Fort McKay; Ron Epp, a pilot from Athabasca; Mike Franchuk, a farmer from the Wandering River area; and Ted West, an Athabasca school superintendent. The federal appointees are Dr. David Schindler, an aquatic biologist who recently received a position with the University of Alberta, and Dr. Bill Ross, a professor in the Faculty of Environmental Design at the University of Calgary.

Friends of the Athabasca, who have voiced concerns about lack of public input on the ALPAC project, are pleased about the public hearings. "We think it's a good thing," says Louis Schmittroth, president of the group. "We're looking forward to a thorough review of not only ALPAC, but also the cumulative impact of all proposed and existing mills."

Lynn Zwicky

forest complexes that require large capital investments and utilization of the forest resource beyond that which would be used by a sawmill," says Con Dermott, director of the Timber Management Branch of Alberta Forestry, Lands and Wildlife.

Under the terms of the forest management agreement, companies are usually given three years to complete a forest management plan which outlines what the company plans to do to manage the area, including harvesting schedules, recreation, watershed issues and wildlife management. The company must also do its own environmental inventory of the area, in order to develop this detailed management plan.

Updated management plans must be prepared every 10 years by the company to take into account advances in technology and environmental change.

The forestry industry, unlike the oil and gas industry, has no formal requirement to hold public hearings on the development of a new FMA. In 1979, the Environmental Council of Alberta recommended more public involvement in a report entitled *The Environmental Effects of Forestry Operations in Alberta.*

However, Forestry Minister Leroy Fjordbotten recently announced that all companies proposing major forest projects will be required to "present their detailed forest management plan to the public for their review and input," Dermott says.

The advantage of seeking more public involvement at forest management plan stage, rather than at the EIA stage, is that many more specifics are known about each forest in the area, he says. Fish and wildlife associations, for example, could obtain detailed answers about management of a particular stream or species, compared with the more generalized outline of a company's approach to stream management which citizens would have to be satisfied with at the EIA stage.

> *Sewall hopes the efforts to involve ordinary citizens "don't end there, with only a series of meetings held to pacify the public."*

"An EIA is great for a facility, but a forest is a living, changing thing," says Dermott. "A one-time EIA does not provide a proper review. As the forest environment changes, new information is collected and new technology is developed. That's why we like the management planning system. A one-time EIA is like going to the dentist once in your life."

Both Dermott and Stone note that forestry decisions are not made in isolation from other government agencies which also seek public participation. For example, the ERCB, the province's Integrated Resource Planning system and the Northern Development Council all involve efforts to give citizens the opportunity to speak out about their concerns. Alberta Forestry also holds open houses at various stages of plan development to provide the general public with an opportunity to participate.

"The message is, we've been doing this for a long time," says Rick Sloan of Peace River, Director of Research and Co-ordination for the Northern Development Council. The council has sought input from citizens

PETER LEE

in the planning and delivery of government services for the north since 1974.

"At our last meeting we received our two thousandth brief," Sloan says, noting that the council prides itself on responding to every brief it receives. He says that although not all matters raised in public meetings can be resolved, the exercise of seeking citizen input often helps to clarify issues.

How has the public participation process worked so far for Betty Sewall?

"The environment department was very co-operative and came to the community to tell us how we could be involved and that public participation was a central part of the EIA process," she says. Sewall admits, however, that she remains unsure of many aspects of FMA development. "But as the winter progressed, the forestry department held a series of public meetings. It was quite a step forward."

She hopes the department's efforts to involve ordinary citizens "don't end there, with only a series of meetings held to pacify the public."

Recent announcements of increased public participation in Alberta forestry projects provide Sewall with some reason for optimism. So do the actions of companies such as the Alberta Energy Company which is planning a CTMP mill near Slave Lake. Dick Wilson of Calgary, director of public affairs, says the company is committed to providing the public with the opportunity to scrutinize its FMA, "once there is something to scrutinize."

In the meantime, public participation has been actively sought at the EIA stage. The company recently held a series of more than 20 public meetings with communities up and down the Lesser Slave River. Another successful decision has been the company's decision to establish a community office in the town of Slave Lake. Anyone with a concern or question about the project can drop in to obtain more information.

Economics Manager Rick Huff says the major public concern about the project revolves around its impact on the water quality of the river. "We've been able to provide reassurance on that issue."

Another issue which surfaced at public meetings concerned the amount of smoke which might be produced by the mill. "Based on that concern, we're committed to install a state-of-the-art waste-wood burner which is basically smoke-free," says Huff.

He has no doubt about the effect of public involvement in the planning process to date: "We think that everyone has really benefited. We're going to end up with a better project."

Yet despite the moves to increase public involvement in forest projects, many environmentalists remain unconvinced that the process has gone far enough. Barry Johnstone of Athabasca, a spokesperson for a group of concerned citizens called the Friends of the Athabasca, is dissatisfied with the current EIA process. He's concerned that the process is "largely overseen by Alberta Environment," rather than being subject to an independent review. Johnstone also notes that "there has never been a pulp mill project that has been stopped by an EIA."

Meanwhile, Sewall is disappointed that she hasn't been able to learn more specifics about how the Alberta-Pacific project will affect her farm. The company's answers to how it will deal with six carloads a day of hazardous chemicals, for example, do not satisfy her.

Stone acknowledges that not everyone can be satisfied by the EIA process. Moreover, some companies just "do a better job than others" in preparing an EIA.

What does it all mean for Sewall? She's just warming up. She and other members of the Prosperity group have had some opportunity since last December to voice their concerns about the proposed pulp mill. But Sewall says she needs answers to many more questions before she can once again feel at peace on what used to be her dream farm.

Gail Helgason, co-author of three outdoor guidebooks on Alberta, is an Edmonton freelance writer.

AROUND THE PROVINCE

by Cathie Bartlett

Greenhouse Controversy

The world's cities, acting as space heaters, may be more to blame than the greenhouse effect in creating a global warming trend.

Dr. Timothy Oke, a geography professor at the University of British Columbia and special consultant on urban climate to the Swiss-based World Meteorological Organization, disputes the theory that there's a global warming trend going on.

Dr. Oke says he agrees with a new study which indicates cities probably act like hot water bottles, warming the environment around them. As cities get bigger and warmer, their increased temperatures probably warm the environment around them.

This contradicts the most popular theory, that a global warming trend has started, brought on by the greenhouse effect— a term referring to the heat-trapping property of gases that pollute the atmosphere.

Dr. Harby Sandhu of Alberta Environment says most scientists agree there has been a slight increase in world temperatures, but cannot pinpoint the cause yet.

"There's no end to the discussion or debate," Dr. Sandhu says, adding the subject was discussed at last year's international conference in Montreal on the changing atmosphere.

"Nobody can say whether it is due to cities or to carbon dioxide or other greenhouse gases."

It will take more research to find out, Dr. Sandhu says.

Dr. Oke says the greenhouse effect indicates a change in the overall climate. "The research about temperature increase in cities indicates only local change, but it affects the global average, although the change itself is not global."

Dr. Oke says a 1988 study released by a meteorologist for the U.S. National Aeronautics and Space Administration raised the first serious alarm about a global warming trend. The study was based on statistics obtained from 3,000 stations around the world.

The results showed a trend indicating a .6 or .7 degree Celsius temperature increase globally, and as well, a swing upward in the last five years, beyond the range of natural variation.

Dr. Sandhu says an increase of about .2 degrees Celsius would be a natural variation.

Dr. Oke says subsequent research by a joint U.S.-United Kingdom group showed that most of the 3,000 stations where temperatures were taken were "contaminated by a local influence"— meaning they were located in a city or at an airport.

Dr. Oke is a specialist on urban climate, and is a member of the UBC geography department's atmospheric studies group.

Blue Boxes Overflowing

Edmonton's blue box recycling program has proven so popular it has been expanded ahead of schedule.

Plastics, cardboard (including rinsed and flattened milk cartons) and glossy magazines joined the ranks of recyclable commodities in July— six to 12 months before originally planned. City officials credited participation from between 70 and 80 per cent of city residents for the early expansion.

The blue boxes made their debut on Edmonton doorsteps in November, and were used to collect household metals and glass and newspapers.

The program will grow again soon, when some apartment and townhouse dwellers get their boxes. For information about what can go in your blue box, Edmonton residents can call 428-2901.

Giving It Back to the Ducks

It's a switch from raising cattle or growing wheat, but some prairie farmers will be paid for making parts of their farmland good duck habitat.

Ducks Unlimited Canada recently launched the Prairie Care program, which encourages farmers in the three prairie provinces to restore cropped marginal farmland to grassland cover.

Gordon Edwards, Alberta manager for Ducks Unlimited Canada, says a combination of drought and modern agricultural practices have been eliminating ground cover from prairie farmland.

"With drier weather and better equipment, they (farmers) can get right up to the slough beds," Edwards says.

The loss of ground cover has meant a drop in the nesting success rate in some areas.

The Prairie Care program staff will work with various municipal and farm groups to get more upland cover established and change farming practices.

The program has a budget of $4.8 million for the three provinces for 1990-91. Alberta will get $2.4 million of that amount.

Edwards says there has been a lot of interest in the program, and many contacts have been made.

The program will focus on the east-central part of the province, and fan out from there.

"Prairie Care is a significant enlargement of farm-based land use programs administered by Ducks Unlimited Canada over the past 10 years," Edwards says.

"These initial programs offered limited incentives to help groups of farmers try out and demonstrate good soil management practices that complemented waterfowl nesting requirements.

"They were very popular and successful in Alberta."

The program is a component of the North American Waterfowl Management Plan and has been approved by the interprovincial and interagency Prairie Habitat Joint Venture Committee. The program's delivery will be the responsibility of Ducks Unlimited Canada and various farm-oriented project delivery groups working under the umbrella of the 15-year joint Canada-U.S. accord.

WARREN CLARK

Around the Province was prepared by Cathie Bartlett, an Edmonton freelance writer.

LETTERS

New Cloth Diapers

Dear Editor:

Your *Environment Views* is excellent. I picked up a copy at our local library, and have sent in the card to have my name added to your mailing list.

Readers wanting more information on disposable diapers may want to send to the address below for a copy of the latest spring printing of *Diapering Alternatives*. It is a free publication (sponsored by diaper services, baby pant manufacturers, etc.). It covers environmental and health issues to consider when choosing a diaper, and also has information on the latest types of cloth diapers on the market. (Many mothers think they'd have to use the square flannel diapers, and fold and pin them, and this discourages them from trying cloth diapers. There are many convenient types of cloth diapers on the market now.)

If you ever plan to do an in-depth article on cloth diapers, please contact me, and I would be pleased to give you samples of the cloth diapers (8 types) and various types of waterproof pants we carry. I think it's important that consumers know about the impact of disposables on the environment, and that with pinless, no-fold, reusable cloth diapers, there is an alternative! The laundry is no more difficult than laundering any other type of article, I find. (I'd be happy to share the exact method I use, if you need details.) After 29,000 diaper changes on my four children, I consider myself an "expert"!

Grace Marcinkoski
Baby Love Products,
5015-46 St.
Camrose, Alberta T4V 3G3

No Plastic Wrappers, Please

Dear Editor:

We receive your publication in our office. Your recent issue of June 1989 concerns what the individual can do in terms of waste management, and provided the information that plastics account for 10 per cent of Edmonton's waste stream.

I detected some irony in the fact that your publication arrived packaged in a plastic wrapper, given the subject matter inside. Perhaps "what you can do" is stop the unnecessary use of plastics for such purposes as wrapping magazines. We receive many publications that are stapled on the side or wrapped in brown kraft paper and they arrive in good condition. Perhaps *Environment Views* may consider one of these alternatives as a more environmentally sound approach to wrapping magazines. Thank you very much.

Erica M. Spiegel, Intern
Michigan Board of Public Works

At the moment, only magazines mailed out of the country are sent in plastic wrapping. We are looking at alternatives.

– editor

Recycled Paper

Dear Editor:

I've just began receiving *Environment Views* again after several years absence. The June 1989 issue contains many useful hints on what individuals can do in response to environmental concerns.

However, I've been wondering since reading this issue, if *Environment Views* is published on recycled paper, or at the very least, unbleached paper. It seems to me that one should practice what they preach.

By the way, I intend to recycle my issues of *Environment Views* by giving them to someone who doesn't receive a copy, and will ask them to pass it on to others in the same way.

I enjoy your publication, especially since it keeps me in touch with issues in my home province.

Anne LeBlanc
Tumbler Ridge, B.C.

At last, we have a supply of recycled paper for our printer. Beginning with this issue, we are printing on recycled paper.

– editor

An Appeal To Parents

Dear Editor:

I was fortunate enough, during Environment Week, to have encountered a display your organization had set up in a local mall. As an individual who considers herself a conservationist (cloth diapers, breast feeding, organic home gardening, home-made baby food, plastic bag re-user, and the like...) the pamphlets and documents attracted my attention. But I write at this time, primarily to tell you what an excellent publication you have. I have read *Environment Views* from cover to cover and can't wait for the next issue. The quality of the writing is superb, and local at that! I have had my eyes opened to how much more I can do to preserve this earth for our children.

For your interest (as a marketing strategy?) it was when we became parents that our dedication to our environmental responsibilities peaked. Maybe it is this population that we could impact most, as they are feeling so protective and responsible for their dependants. For example, as a start, perhaps a publication could be distributed to pre-natal classes that addresses choices of diapering, feeding, cleansing agents, etc., and include the environmental effects of their choices. This is a particularly vulnerable point in one's life when they are very open to information that will help them do the best for their child (even if it is in the far off future). And let me tell you, there are a lot of commercial manufacturers that have figured that out and are bombarding us with information and coupons for their products. I do recognize that each of us is responsible for "spreading the word" but more exposure (to your information) would also be of great value.

Now to the goal of this letter; please put my name on your subscription list. You will notice also a listing for E. Bourgonje, my husband. This may initially seem wasteful, so please be aware that his copy is for the school that he teaches in, and I might never get a chance to see it (I hope it will be in constant use there)! I would appreciate a copy of my own that I can digest and circulate to others. Thank you in advance. Keep up the good work!

Terry Bourgonje

The Yuck Factor

Dear Editor:

This was a good issue with many useful ideas. I do, however, have to take issue with one comment in the "Cutting Back on Garbage Day" article by Hazel Sangster.

Your local kindergarten or playschool never needs toilet paper rolls for any art project. If you look you will find visible fecal contamination on the edge or inside of some of these rolls. Many more are contaminated but not to the same degree. Enteric disease organisms, like all bacteria, are not visible without a microscope.

If you have any questions or concerns, please contact me.

Cliff G. Turner, Manager
South Peace Health Unit

BOOK REVIEW *by David Spalding*

Handbook of the Canadian Rockies.

Geology, plants, animals, history and recreation from Waterton/Glacier to the Yukon.

Ben Gadd. Corax Press, Jasper, Alberta. 1986. 876 pp.
Kivar (soft) cover, $25.

"Someone had to write this book," explains Gadd in his preface. "It was either that or keep lugging all those other books around." And indeed, this solid volume is mainly a compilation of information which is largely obtainable in print — somewhere — in field guides with North American coverage, and scientific reports in more or less obscure journals. But the average reader would need several years of research to locate it, and someone as knowledgeable as Gadd to interpret it. And since Gadd brings over 25 years of knowledge of the Rockies, and a considerable experience of personal interpretation to making this book, it easily becomes the one Rockies book indispensable to any serious visitor.

To make a book of nearly 900 pages into a field guide takes a bit of doing, and Gadd has not quite brought off a pocket-sized volume. However, the softbound volume will easily fit a packsack pocket, and the nine-point print will not bother the eyes of most. The book is crammed with detail, from the metric conversions inside the front cover to the protractor for plotting a compass course inside the back cover. An introduction defines the area (Waterton-Glacier to the Liard River, and the foothills to the western ranges east of the Rocky Mountain Trench), and then splits the mountains into clearly defined regions. The bulk of the book (85 per cent of the text) covers geology and natural history, with smaller sections on geology, landscapes, climate, ecology, plants, invertebrates, snow life, fish, amphibians and reptiles, and birds. The mammal section finishes with a tongue-in-cheek but appropriate description of *Homo Sapiens*: "predominantly migratory… living in densely colonial campgrounds." A chronological survey then goes from 11,500-year-old prehistoric remains, and gives key historic events from 1754 when Henday first sighted the Rockies up to the 1986 presentation of a management framework for the mountain parks. The final sections are on selected types of recreation (autotouring, backpacking, climbing, etc.) and safety. A brief afterword discusses conservation in the mountains, explaining the popularity of Canada's Rockies with Americans because of the mess made of the mountains south of the border, and makes the case for national parks in the northern Rockies.

Each section has a lot of detail, from a brief introduction, through discussion of numerous geological formations or species, to a (sometimes usefully annotated) bibliography. The more experienced reader may be confused by an unfamiliar new sequence of plants, and an individual, even quirky grouping of birds, but these will not worry the beginner. There are some inconsistencies; for instance the inclusion of a hypothetical species of snake (bull snake) seems inappropriate when many birds are not mentioned at all.

The text is sometimes solid and textbookish, occasionally a bit discursive, and usually well cross-referenced. Frequent informal comments convey the feeling that a friendly and approachable park naturalist is on the spot with you, not just giving you the facts, but explaining them in entertaining, perhaps idiosyncratic, ways. Some of the simplifications are inevitably misleading — the term "collision" for instance hardly conveys the interaction of crustal plates over millions of years — but others are happy and illuminating, like the description of a deep frozen wood frog which "goes clunk if you tap it" yet can recover and hop away. Throughout there is a nice sensitivity to the natural environment; without being lectured the reader is reminded that he/she is not the only — or most important — user of parks. There is even a useful suggestion of what to say if you see someone feeding a bear: "I thought you should know that if a warden sees you doing that it's a $500 fine. Oops — I think I see one turning around!" There are some inaccuracies (did the Hudson's Bay Company really have hat factories?), and extremely rare typos.

Many of the illustrations are literally borrowed (with permission) from other books, but are unfortunately often reproduced at a scale that makes it almost impossible to read labels or appreciate detail. A section of color photographs defines key ecological features, but also points up the inadequacies of reproduction of many of the black and white photos, which (even when reproduced at half- and full-page size) are often rather grey and featureless. The maps too would have been helped by color, particularly the grey ones at the end which are almost unreadable on this scale. The many sketches of plants, invertebrates and skulls would have been much more useful if scales had been attached.

Despite a few weaknesses, this is an invaluable book to the reader interested in experiencing the Rockies. Anyone who has lugged "all those other books around" for years can be grateful to Gadd for putting all the essential information on the Rockies in a convenient package, and illuminating it in such an entertaining way. If the initial favorable public response continues, perhaps a new edition can remedy the weaknesses and allow the creation of a mountain classic.

David Spalding, an Edmonton freelance writer and heritage consultant, is vice-president of Kanata Heritage Research & Presentation Corporation.

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ENVIRONMENT UPDATE

Wilderness 2000?

Monte Hummel, president of the World Wildlife Fund Canada, will be in Edmonton Sept. 20 (7:30 p.m. SUB Theatre, U of A) for a presentation on **Endangered Spaces: The Future For Canada's Wilderness**, as part of a cross-Canada tour launching a 10-year campaign for the establishment of protected areas representing each of the natural regions of the country. The challenge will be to complete a national network of protected lands and waters — new parks, wilderness areas, ecological reserves, etc. — before the opportunity is lost.

Admission is $5; $3 for students. For tickets or further information call Bonnie McFarlane 492-2056 or Sam Gunsch 453-8658.

Bow River Issues

The Bow River is the subject of a conference on **Sharing the Flow in a Thirsty Future**, November 19-22 at the Marlborough Inn in Calgary, sponsored jointly by the Canadian Water Resources Association and the Alberta Irrigation Projects Association.

Papers will examine water use and management in the Bow River basin; the current legal and institutional framework for managing water shortages; sustainable levels of development and the tradeoffs that will be needed in the future, with the resulting impact on both instream and consumptive uses. The conference will feature presentations from all water use sectors, panel discussions, and a field trip to the Bonnybrook Sewage Treatment Plant and WID canal headworks rehabilitation. Guest speakers will include Environment Minister Ralph Klein.

For further information and registration, contact Mrs. J.A. Ross, 2014 -14 Ave. N., Lethbridge T1H 1V8, or D.E. Mortin, c/o UMA Engineering Ltd., 2540 Kensington Road NW, Calgary T2N 3S3.

Reducing Industry Waste

Environment Canada, Western and Northern Region, is holding a one-day seminar on waste reduction in industry, November 14, 1989. Topics will include Emerging Policies, Regulations and Their Relation to Waste Reduction; Hazardous Waste Management Planning; Waste Reduction Audit; and WHMIS.

For details or registration, contact Roy Nixon or Eric Tsai, Environment Canada, 4999-98 Avenue, Twin Atria No. 2, 2nd Floor, Edmonton T6B 2X3; 468-8012.

Hazardous Materials Update

Haztech '89, an industry trade show for products and techniques in environmental control and hazardous materials management, will be held at the Northlands Agricom in Edmonton October 18-20. The conference program will include emergency response capabilities, treatment, modern disposal techniques and economic, legal and legislative considerations.

For further information, contact Canadian Exhibition Management in Edmonton, 469-2400.

Oil and Gas Issues

A conference on **Environmental Law Issues Confronting the Oil and Gas Industry** will be held September 29 at the Palliser Hotel in Calgary. Presented by Insight Educational Services, it will include sessions led by a team of experts from the legal, regulatory and energy sectors to address key environmental issues as they relate to the oil and gas industry.

To register, or for further information, contact Insight at 1599 Hurontario St., Ste. 202, Mississauga, Ontario L5G 4S1, (416)891-2020.

Into the Future

The Environmental Law Centre and the Legal Education Society of Alberta are presenting a conference on environmental law issues, to be held in Edmonton on October 19 and 20. **Into the Future: Environmental Law and Policy for the 1990s** will be of interest to the law profession and the public. Speakers will be identifying current trends and issues in law and policy for the 1990s, including such topics as government regulation ("Pollution as a criminal offense"); the common law ("The role of civil litigation"); business and industry ("Toxic real estate transactions"); "Corporate strategies for dealing with environmental issues"); public interest litigation; and the legal profession ("What the general practitioner should know").

For further information, contact the Legal Education Society of Alberta, 2005, 10201 Jasper Ave., Edmonton T5J 3N7, 420-1987.

If you have a short news item of province-wide interest you'd like to contribute to Environment Update, please send it to the editor at the address on the Contents page. The editor reserves the right to select and edit items.

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